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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/555,657	11/04/2005	Tsumoru Ohata	043888-0412	9671
53080 7590 03/30/2011 MCDERMOTT WILL & EMERY LLP 600 13TH STREET, NW WASHINGTON, DC 20005-3096				
EXAMINER				
LEE, CYNTHIA K				
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1726				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/555,657

**Applicant(s)**

OHATA ET AL.

**Examiner**

CYNTHIA LEE

**Art Unit**

1726

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 December 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 4-9, 16-22 and 25-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 4-9, 16-22 and 25-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

***Response to Amendment***

This Office Action is responsive to the amendment filed 5/7/2010. Claims 1, 4-9, 16-22 and 25-27 are pending.

Applicant's arguments have been fully considered, and are persuasive. Claims 1, 4-9, 16-22, and 25-27 are non-finally rejected for the reasons stated herein below.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 6, 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitation "resin fine particles" is indefinite (emphasis added).

***Claims Analysis***

To avoid 35 USC 112, 2<sup>nd</sup> paragraph issues, the limitation "indefinite-shape particle" has been defined as "shapes having knots, bumps, or bulges based on the primary particles, that is, for example, shapes like dendrite, grape clusters, or coral, unlike shapes that are spherical or egg-shaped, or that are similar to such shapes" as supported by the Specification pg 5 paragraph [0009].

***Claim Rejections - 35 USC § 102/103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4, 5, 8, 16-18, 21-27 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Gozdz (US 5571634), as evidenced by Hubbard, Encyclopedia of Surface and Colloid Science, vol.4: Por-Z, 2002, 4397-4398.

Gozdz discloses a secondary battery comprising: a positive electrode 13; a negative electrode 17; a porous electron-insulating layer 15 adhered to a surface of at least one selected from the group consisting of said positive electrode 13 and said negative electrode 17; and an electrolyte 15, wherein said porous electron-insulating layer comprises a particulate filler (fumed alumina, 4:9) and a resin binder (VdF:CTFE, 3:55).

Regarding the limitation "said particulate filler substantially comprises an indefinite-shape particle, comprising a plurality of single crystalline particles, which has the shape of dendrites, grape clusters, or coral, said shape having a neck, wherein said

neck is formed between and joins at least a pair of said single crystalline particles, said neck comprising the same material as said single crystalline particles,” the nature of fumed alumina particles meet the limitation. Hubbard evidences that fumed alumina has a similar voluminous structure to fumed silica (pg 4398, 1<sup>st</sup> full paragraph). Fumed silica has a voluminous structure of roughly globular, extremely small particles partly fused into relatively short, highly branched frameworks that are known as aggregates (Applicant's indefinite-shaped particles) (fig. 1 of Hubbard). The globular particles are the smallest discernible elements of fumed silica and are called primary particles. Their diameter can range from 3 to 50 um depending on the grades of silica. The aggregates, in turn, are clustered in large, three-dimensional, extremely weak networks termed agglomerates. In contrast to aggregates, where particles are strongly held together by necks formed by partial fusion, agglomerates are formed because of weak van der Waals forces. Therefore, aggregates are stable associations that are difficult to disintegrate into primary particles, whereas agglomerates are fragile and can be readily decomposed into their aggregate components by intense agitation (pg 4397, 1<sup>st</sup> full paragraph).

Regarding the limitation in claim 1, “said indefinite-shape particles maintain their shape when subjected to a shearing force to disperse the particles in a liquid component to form a slurry”, the “aggregations” of fumed alumina meet the limitation.

Regarding claims 1 and 16, Gozdz does not expressly disclose the porosity of the separator. Delnick discloses that the separator is a liquid-electrolyte-permeable separator, which comprises a matrix of solid particulate material which permits liquid

electrolyte to permeate the layer of solid particulate material (5:25-27). Delnick further discloses that the binder in the separator ink works like an adhesive that adheres individual filler particles to each other, leaving the interstices between the particles open (8:25-27). It would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the amount of open interstices in the separator/electrolyte element of Gozdz for the benefit of allowing the electrolyte to permeate the separator.

Regarding claim 4, 17, said indefinite-shape particle comprises a plurality of primary particles bonded to each other, and said indefinite-shape particle has a mean particle size that is twice or more than the mean particle size of said primary particles and not more than 10  $\mu\text{m}$ . Hubbard evidences that the aggregates contain several to tens of primary particles that are between 0.01 to 0.3  $\mu\text{m}$  in size (pg 4397, 1<sup>st</sup> full par.).

Regarding claim 5, 18, said indefinite-shape particle comprises a metal oxide (Gozdz'a fumed alumina, 4:9).

Regarding claim 8, Gozdz discloses said positive electrode comprises a composite lithium oxide (1:1:51)), said negative electrode comprises a material capable of charging and discharging lithium (1:58), and said electrolyte comprises a non-aqueous solvent and a lithium salt dissolved in the non-aqueous solvent (2:63-65).

Regarding claim 16, the aggregation of single crystalline particles of fused alumina reads on Applicant's "polycrystalline particles."

Regarding claim 21, Gozdz discloses said same material as said primary particles is a metal oxide (4:9).

Regarding claims 22, 25, said indefinite-shape particles are adhered with said binder.

Regarding claims 26, 27, Gozdz discloses said metal oxide comprises alumina particles (4:9).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 16 are rejected under 35 U.S.C. 103(a) as obvious over Delnick (US 5948464) in view of Gozdz (US 5571634), as evidenced by Hubbard, Encyclopedia of Surface and Colloid Science, vol.4: Por-Z, 2002, 4397-4398.

Delnick discloses a secondary battery comprising: a positive electrode; a negative electrode; a porous electron-insulating layer adhered to a surface of at least one selected from the group consisting of said positive electrode and said negative electrode (9:25-40); and an electrolyte (5:5), wherein said porous electron-insulating layer comprises a particulate filler(6:45-52) and a resin binder (7:5-15).

Regarding the indefinite-particle shape, Delnick discloses of fillers using fumed silica. It is noted that fumed silica are amorphous particles, and not crystalline. See Hubbard, pg 4397, 1<sup>st</sup> full paragraph. Gozdz teaches a separator using inorganic fillers

such as fumed silica or fumed alumina (3:55-4:9). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use either fumed silica or fumed alumina, as taught by Gozdz, since it has been held by the court that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

Regarding the limitation in claims 1 and 16 "said particulate filler substantially comprises an indefinite-shape particle, comprising a plurality of single crystalline particles, which has the shape of dendrites, grape clusters, or coral, said shape having a neck, wherein said neck is formed between and joins at least a pair of said single crystalline particles, said neck comprising the same material as said single crystalline particles," the nature of fumed alumina particles meet the limitation.

Hubbard evidences that fumed alumina has a similar voluminous structure to fumed silica (pg 4398, 1<sup>st</sup> full paragraph). Fumed silica has a voluminous structure of roughly globular, extremely small particles partly fused into relatively short, highly branched frameworks that are known as aggregates (Applicant's indefinite-shaped particles) (fig. 1 of Hubbard). The globular particles are the smallest discernible elements of fumed silica and are called primary particles. Their diameter can range from 3 to 50 um depending on the grades of silica. The aggregates, in turn, are clustered in large, three-dimensional, extremely weak networks termed agglomerates. In contrast to aggregates, where particles are strongly held together by necks formed by partial fusion, agglomerates are formed because of weak van der Waals forces.



Therefore, aggregates are stable associations that are difficult to disintegrate into primary particles, whereas agglomerates are fragile and can be readily decomposed into their aggregate components by intense agitation (pg 4397, 1<sup>st</sup> full paragraph).

Regarding the limitation in claim 1, "said indefinite-shape particles maintain their shape when subjected to a shearing force to disperse the particles in a liquid component to form a slurry", the "aggregations" of fumed alumina meet the limitation.

Regarding claims 1 and 16, Delnick does not expressly disclose the porosity of the separator. Delnick discloses that the separator is a liquid-electrolyte-permeable separator, which comprises a matrix of solid particulate material which permits liquid electrolyte to permeate the layer of solid particulate material (5:25-27). Delnick further discloses that the binder in the separator ink works like an adhesive that adheres individual filler particles to each other, leaving the interstices between the particles open (8:25-27). It would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the amount of open interstices in the separator for the benefit of allowing the electrolyte to permeate the separator.

Claims 7 and 20 are rejected under 35 U.S.C. 103(a) as obvious over Delnick (US 5948464) in view of Gozdz (US 5571634), as evidenced by Hubbard, Encyclopedia of Surface and Colloid Science, vol.4: Por-Z, 2002, 4397-4398) as applied to claims 1 and 16, in view of Waterhouse (US 4363856).

Delnik modified by Gozdz teaches all the elements of claims 1 and 16 and are incorporated herein. Delnik modified by Gozdz does not disclose that the resin binder

comprises a polyacrylic acid derivative. Delnik discloses that the resin comprises PVC, PVdF, and EPDM resin (7:5-15). Waterhouse teaches of using acrylic acid as a binder for the separator (3:35). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute acrylic acid of Waterhouse for Delnik's resin because it has been held by the court that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

Claim 9 is rejected under 35 U.S.C. 103(a) as obvious over Gozdz (US 5571634), as evidenced by Hubbard, Encyclopedia of Surface and Colloid Science, vol.4: Por-Z, 2002, 4397-4398, as applied to claim 1, in view of Yu (US 6080507).

Gozdz discloses all the elements of claim 1 and are incorporated herein. Gozdz discloses a porous insulating member, but does not disclose further comprising a separator sheet that is interposed between said positive electrode and said negative electrode, said separator sheet being independent of both said positive electrode and said negative electrode. Yu teaches a trilayer separator. The trilayer comprises a shutdown layer made of a filler and a polymer (4:10-15) wherein each side is sandwiched by a microporous layer. See Abstract. The trilayer exhibits reduced splitness and good puncture strength (3:20-22). It would have been obvious to one of ordinary skill in the art at the time the invention was made to add additional layers to the insulating layer of Gozdz, as taught by Yu, for the benefit of providing added strength and protection against puncture.

***Response to Arguments***

Applicant's arguments filed 12/22/2011 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CYNTHIA LEE whose telephone number is (571)272-8699. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Cynthia Lee/  
Examiner, Art Unit 1795